



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,075	08/11/2006	Andrew Maxwell Scott	124-1166	5828
23117 7590 06/24/2009 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
LAPAGE, MICHAEL P				
ART UNIT		PAPER NUMBER		
2886				
MAIL DATE		DELIVERY MODE		
06/24/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/589,075

Applicant(s)

SCOTT ET AL.

Examiner

MICHAEL LAPAGE

Art Unit

2886

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-16 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-3, 5-16 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI-08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-3, 5-16, and 19-21 are presented for examination, claims 4, 17, 18, 22-23 were cancelled in amendment filled.

Claim Objections

2. Claim 11 recites the limitation "said source" in line 11. There is insufficient antecedent basis for this limitation in the claim. It is however believed "said source" is referring to "said radiation means" and is therefore being interpreted as such.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-2, 5-7, 11, 13-16, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Devie et al (U.S. PGPub No. 2003/0112426 A1).**

As to claims 1 and 19, Devie discloses and shows in figure 3, an apparatus for indicating the departure of a shape of an object from a specified shape, the apparatus comprising:

radiation means (40) for directing an incident beam of radiation onto the object (34) ([0065]), and

inspecting means (46 and 48 and 50) for inspecting the final beam after transmission by or reflection from said object ([0065]),

at least one wavefront shaping means (42) is disposed between the radiation means and the inspecting means, wherein the apparatus is arranged so that the final beam will have a substantially planar wavefront when said object has said specified shape, and said at least once wavefront shaping means is arranged to compensate for non-planarity introduced by said object having said specified shape, and said inspecting means is arranged to determine any departure of the wavefront of the final beam from planarity, wherein said inspecting means comprises ([0065]; [0071]):

beamsplitting means (48 and 50) for splitting the final beam into two or more beams and for directing said two or more beams to laterally displaced locations ([0052]; [0065]; where shown in figure 3, microlens array inherently focuses as shown light in multiple lateral locations along detector surface 48); and

detector means (50) for detecting radiation intensity of said two or more beams on the detector means ([0052], where inherently the CCD as disclosed are detecting intensity).

When 35 USC 112 6th paragraph is invoked, it requires the radiation means to use only one (1) source which Devie does not explicitly disclose.

However, Devie discloses the use of two light sources (40 and 52), each of the light sources for measuring separately each side of the object under test. One of ordinary skill in the art at the time the invention was made would recognize that only 1 source is required in the system of Devie specially for measuring one side of the object under test. Further, Devie uses an additional source for providing the advantage of being able to measure the other side of the surface under test. Therefore, one of

ordinary skill in the art would recognize that the system of Devie is fully functional with one source to provide measurement of one side of the object under test.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie by providing one source instead of two in order to provide the advantage of reduction in cost through the removal of additional optical components. Further, in Fig 2, Devie also uses only one source for radiation means.

The subject matter of claims 1 and 19 relate in that the technical features of apparatus claim 1 are in each case suitable for implement the method of claim 19, therefore the method is obvious in view of the above apparatus rejection.

As to claim 2, Devie discloses and shows in figure 1, an apparatus wherein said radiation means (8) is arranged to produce a collimated beam (i.e. by collimator lens 10) of radiation ([0055]).

As to claim 5, Devie discloses and shows in figure 3, an apparatus wherein at least one said wavefront shaping means is located between the radiation means and the object (Fig. 3, explicitly showing wavefront shaping means 42 between radiation means 40 and object 34).

As to claim 6, Devie discloses and shows in figure 5, an apparatus wherein at least one said wavefront shaping means (70) is located between the object (62) and the inspecting means (80) (Fig. 5, does explicitly show a separate embodiment that uses the same wavefront shaping means in order to provide a plane wavefront as is being interpreted to be physical between the inspecting means and the object).

As to claim 7, Devie discloses and shows in figure 3, an apparatus wherein at least one said wavefront shaping means comprises a lens (42) or curved reflector ([0065]).

As to claim 11, Devie discloses and shows in figure 3, an apparatus comprising a beam splitter between said source and said inspecting means (Fig. 3, where figure 3 explicitly shows beamsplitter means 44 between inspection means and said source).

As to claim 13, Devie discloses and shows in figure 3, an apparatus wherein the beamsplitting means of said inspecting means comprises non-diffractive beamsplitter (44, where implicitly the beamsplitter is disclosed as just a semireflecting plate which implicitly does not contain any diffractive qualities) means for receiving light from two spaced object planes (i.e. one of the multitude of points along curved surface of object 34) along a common path for transmission to first and second image areas along respective first and second optical paths, and focusing means (i.e. microlens array 48) arranged to bring said first and second object planes into focus in said first and second areas ([0065]; where inherently each lens will perform the function of focusing the light on multiple areas of CCD detector 50).

As to claim 14, Devie discloses an apparatus wherein the inspecting means is arranged to provide an analysis of the shape, or components of the shape, of the wavefront of the final beam ([0058]).

As to claims 15 and 16, Devie discloses an apparatus wherein the detector means of the inspecting means comprises a pixelated imaging photosensor (i.e. CCD

18) such wherein the pixelated imaging photosensor is a charge coupled device (CCD) array ([0052]; [0058]).

As to claim 20, Devie discloses a method wherein said object is an optical component ([0065]; Fig. 3, item 34).

As to claim 21, Devie discloses a method wherein said optical component is a window or is of generally laminar form, or comprises a planar reflective surface (Explicitly show in Fig. 3, the examiner is interpreting lens 34 as a windows as shown it transmits light).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Devie in view of Kuchel.

As to claim 3, Devie does not explicitly disclose where wherein said incident beam of radiation is optical radiation.

However, Kuchel does disclose in ([0021]) an apparatus wherein said incident beam of radiation is optical radiation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with using optical wavelength ranges in

order to provide the advantage of increased versatility from using the wavelength range that is most commonly used for optical components.

As to claim 10, Devie does disclose where the object includes an adjusting means (32) ([0062])

Devie does not explicitly disclose an apparatus and including means for adjusting the relative position of the said wavefront shaping means.

However, Kuchel does disclose in ([0015], lines 1-7) where the legs of the interferometer have supports for positioning. One of ordinary skill in the art at the time the invention was made would recognize that in an optical lens system the lenses and object are obviously moveable in order to direct light in specific paths and at specific focus points.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kuchel by providing a moveable object and wavefront shaping means in order to provide the advantage of a versatile system that can accommodate many optical components through repositioning.

7. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Devie in view of Burge et al (U.S. Patent No. 5,737,079).

As to claims 8 and 9, Devie does not explicitly disclose an apparatus wherein at least one said wavefront shaping means and beamsplitting means comprises a diffraction grating or hologram or is provided by a spatial light modulator.

However, Burge does disclose in (col. 2, lines 17-31) where both spatial filters (i.e. spatial light modulators) and diffraction gratings can be used in order to manipulate

wavefronts (i.e. to be used as wavefront shaping means) in order to match a reference wavefront to the shape of an expected wavefront.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with a diffraction grating or spatial light modulator in order to provide the advantage of increased versatility in having multiple ways in which to shape a wavefront to a desired shape before impinging on an object under test.

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Devie in view of Almogy et al (U.S. PGPub No. 2003/0058433 A1).

As to claim 12, Devie does not explicitly disclose where the beamsplitting means of said inspecting means comprises at least one of a diffraction grating and hologram.

However, Almogy does disclose in ([0078]) the use of a diffraction grating in place of a beamsplitter in order to split a beam of light. Therefore because the two beam splitting devices were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute a beamsplitter for a diffraction grating.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Devie with a diffraction grating in order to provide the advantage of added versatility due to an additional optical component which can be used to provide beam splitting capabilities.

Response to Arguments

9. Applicant's arguments with respect to claims 1-3, 5-16, and 19-21 have been considered but are moot in view of the new ground(s) of rejection.

Prior Art made of Record

10. The prior art made of record and not relied upon is considered pertinent to applicants disclosure.

- a. Ohsaki et al. (U.S. PGPub No. 2002/0176090 A1) discloses a similar wavefront shaping means capable of deforming and providing a planar wavefront to a surface under test.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL LAPAGE whose telephone number is (571)270-3833. The examiner can normally be reached on Monday Through Friday 7:30AM-5:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on 571-272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael LaPage/
Examiner, Art Unit 2886

/TARIFUR R CHOWDHURY/
Supervisory Patent Examiner, Art Unit 2886